

**Abstract**

An intraoperative tissue assessment device and method based on optical and mechanical techniques that allows a surgeon to assess certain mechanical properties of tissue samples. The device includes a cavity for housing and securing at least a portion of the tissue sample in communication with a pressurization source to inflate a portion of the tissue forming a dome of tissue having a height axis substantially perpendicular to the tissue sample secured within the cavity. The height of the dome of tissue along the height axis is generally proportional to the strength of the tissue sample. A source of illumination projects collimated light rays in the direction of the dome of tissue illuminating the dome of tissue and creating a Moiré fringe pattern, which may be used to determine the degree of anisotropy of the tissue sample when viewed through a viewing port arranged substantially directly above the dome of tissue.